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|  | **Ho Chi Minh City University of Technology**  **Department of Electrical and Electronics Engineering** | | |
| **FINAL EXAMINATION**  Grading: 40% | | | **Computer System Engineering**  Course ID: 407406 |
| **Date: 14 Dec., 2018** | | | **Duration:** 90 minutes |
| **Student name:**  **Student ID:** | | | **Examiner’s name & signature:** |
| **Score:** | | Students are allowed to use *one A4 page with two sides* for reference.  Books and other documents are not allowed to use. | |
| **This examination consists of 4 pages** | |

**Problem 1:** (20pts) Answer the following questions

1. What is the first CPU to include an internal math coprocessor? (386DX, 486SX, 486DX, or Pentium?)

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| **486DX** |

1. How many bits of **word size** and **data path** are there in 80486 processor?

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| **32 bit word size, 32 bit data path** |

1. What are advantages and disadvantages of the secondary memory?

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| **Advantages: high capacity, non-volatile**  **Disadvantages: slow speed** |

1. Find the five-hex-digit address that corresponds to each of these segment : offset pairs

2564:730A =>

0287:0E9F =>

1. Assume that we have the memory content as below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Address | 0x0 | 0x1 | 02 | 0x3 |
| Content | 62 | 5F | C3 | 2F |

What are the 32-bit data when we read a double-word at the address 0x0 with Big Endian mode? **625FC32F**

**Problem 2:** (20pts) Answer the value of registers after the instruction is executed.

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| --- | --- | --- | --- |
| **No.** | **Before** | **Instruction** | **After** |
| 1 | EAX:  EBX: | mov ebx, eax | AX:  BX: |
| 2 | ECX: | mul ecx | ECX: |
| 3 | EAX:  EBX: | imul ebx | EAX:  EBX: |
| 4 | EAX: | sub eax, 120 | EAX:  SF:0 ZF:1 CF:0 OF:0 |
| 5 | AX: 03 10  word at Value: 01 F2 | imul ax, Value | AX:  SF:0 ZF:0 CF:0 OF:1 |

**Problem 3:** (10pts) Write 80x86 assembly language code for the following C procedure:

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| **C procedure** | **ASM procedure**  *Assume that S is stored in EAX, N is stored in EBX* |
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**Problem 4:** (10pts) Write 80x86 assembly language code for the following C function.

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| --- | --- |
| int Calc(int x, int y, int z)  {  int t1  return rval;  } | **Calc:** |

**Problem 5:** (10pts) Write an 80x86 Assembly language program to compute S = 54\*(x+y) - 49\*z + 8. Assume that:

* S is stored in register EAX
* x is stored in register EBX
* y is stored in register ECX
* z is stored in register EDX

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| **add EBX,ECX**  **imul EBX,54**  **imul EDX,49**  **sub EBX,EDX**  **add EBX,8**  **mov EAX,EBX** |

**Problem 6:**  (10pts) Given the Interrupt Vector Table below.



Determine the address of ISR of a device with the interrupt vector FBh.

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| Address in table = 4 X FBH = 3ECH  (Multiply by 4 since each entry is 4 bytes)  Offset Low = [3EC] = 3A, Offset High = [3ED] = 54  Segment Low = [3EE] = 54, Segment High = [3EF] = 7F  Address = 7F54:543A = 7F540 + 543A = 8497A |

**Problem 7:** (10pts) What are the purposes of limit checking?

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**Problem 8:** (10pts)

1. Write C++ instructions to free the memory of the following array:

Student \*\*p = new Student\*[500];

for(int i=0;i<500;i++)

p[i] = new Student[50];

|  |
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| for(int i=0; i<500; i++)  delete p[i];    delete[] p; |

1. Write C++ instructions to provide memory allocation for 200 float numbers which are addressed by the pointer q.

float \*q = new float[200];

*--------------------------------------------------- The end ------------------------------------------------------*

*Electronics Department Lecturer*

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